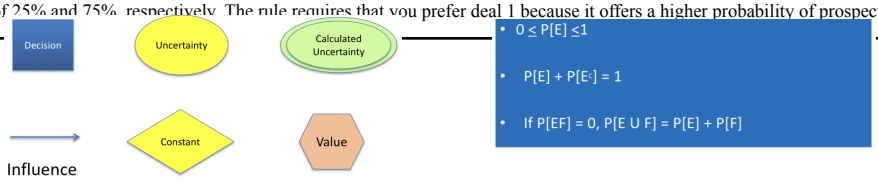
A decision is an irrevocable allocation of resources A good outcome is the occurrence of a favorable event - one that we like. All of the following are true except Decision Analysis is largely an intuitive process	A good decision is one that is logically consistent with our preferences for the potential outcomes, our alternatives, and our assessment of the uncertainties. A good outcome is the occurrence of a favorable event - one that we like.	Decision traps lack of frame control plunging in frame blindness shooting from the hip	Financial complexity isn't part of decision complexity Technical knowledge is essential for credibility, business knowledge is essential for success
Anchoring and Adjustment Bias Relying too heavily or "anchoring" on a piece of information and failing to adequately adjust from that anchor. **Availability Bias** Predicting frequencies or probabilities of events based upon how easily an example can be retrieved by memory		**Confirmation Bias** Searching or interpreting information in a way that confirms one's preconceptions. **Framing Effect** Drawing different conclusions from the same information depending on how that information is presented.	
A group of analysts and stakeholders evaluate alternatives in a working session. There is limited exchange of information. never gets to a consensus recommendation, spent most of the day trying to agree upon the process and bickering over small details. The group never had sense of purpose, wasn't committed to the results. **Group failure**	Millions of dollars spent years ago to reduce damage to crops caused by mechanical tomato pickers. The problem was described as "develop a better mechanical tomato picker". early efforts were unsuccessful, the problem was reframed as "reduce damage to the tomato." problem was solved by thicker skinned tomato. **Frame blindness/inadequate problem formulation**	analyst spent months gathering data to evaluate three companies. Hefekt he didn't have "all" of the data. feared making the wrong decision and concluded better off making no decision yet. He decide to tell the decision maker they needed more time to gather more data. As a result company lost the opportunity. **Decision Paralysis**	Team of analysts spent time analyzing a problem through qualitative, intuitive judgments such as looking at pros and cons of the alternatives. came to consensus, unable to effectively defend it to the decision maker. "winged it" instead of using procedures to document the reasons. difficult to defend their recommendation. **Failure to audit/ document rationale for decision process/judgment.**
VFT starts with a good set of alternatives and then determines the best way to evaluate them. VFT first focuses on the preferences and values of the decision maker and is used to generate and evaluate alternatives VFT helps to create decision opportunities by being proactive; alternative focused thinking tends to be reactive VFT is significantly better approach than AFT for making high stakes, time urgent, and multi-stakeholder decisions.		A MODA model can evaluate measures as a single-value metric via a multi-dimensional value function which can then be transformed into utility through a single-dimensional utility function A MODA model can evaluate value measures as utility directly through a single-dimensional utility function Decision makers' risk preference are essential inputs to any MODA approach that is used. **Decision-makers' trade-off preferences are only necessary if a multi-dimensional value function is used.**	

An influence diagram does not contain all of the information needed to build a model to include sequencing of events
Not 1 of Keeney's 10 questions: What are the risks of not meeting your strategy?
False: project values and costs are dependent,optimum portfolio is obtained by rank projects by benefit to cost ratio,chose projects in order until funds exhausted.
Four categories used to group issues are decisions, uncertainties, values, and other.
The absence of an arrow between two uncertainties in an ID implies probabilistic independence. Strategic, Tactical, Operational

1. The probability rule requires that you can fully describe any deal in terms of possibilities and probabilities. A possibility is a clear description of an event that may or may not occur. A set of possibilities (also called an outcome space) is complete if they are mutually exclusive (only one may occur) and collectively exhaustive (one of the sets must occur).
2. The order rule requires that you can rank any set of prospects in order of preference from best to worst. Indifference (i.e., equal preference) between two prospects is allowed. This rule implies transitivity of preference. If you prefer A to B and you prefer B to C, then you must prefer A to C (i.e., C cannot be both below A and above A in the preference ranking).
3. The equivalence rule requires that you can always create an uncertain deal involving two prospects such that you would be indifferent between receiving that deal and receiving a third prospect that is intermediate in your preference ranking between the two prospects in the deal. So, if you prefer A to B and prefer B to C, then the rule requires that there is a probability p such that you are indifferent between (1) a deal that gives you A with probability p and C with probability (1‐p) versus (2) receiving B for sure. The probability p is called a preference probability because it is defined by your preferences/. Prospect B is said to be the certain equivalent of the deal involving A and C with the preference probability that you specify.
4. The substitution rule requires that your preference for a prospect will not change if an uncertain deal contained in the prospect is replaced by its certain equivalent, or vice versa.
5. The choice rule requires that if given the choice between two deals involving the same two prospects but with different probabilities, you must prefer the deal having the higher probability of receiving the more preferred prospect. Suppose that you prefer A to B and that you are offered two different deals. In deal 1, you would receive either A or B with probabilities of 40% and 60%, respectively. In deal 2, you would receive either A or B with probabilities of 25% and 75%, respectively. The rule requires that you prefer deal 1 because it offers a higher probability of prospect A.



(CH9.1-9.5_08) Calculate the NPV of the following cash flow of an initial investment of $100,000 now using an interest rate of 0.1. Enter your answer as the actual amount rounded to one decimal place (e.g., 54871.2) rather than in $K (e.g., 54.9).

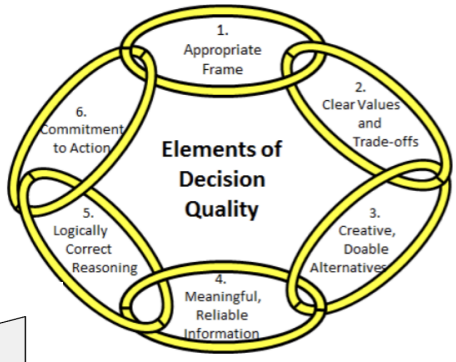
	Year 1	Year 2	Year 3	Year 4
Revenue ($)	25000	50000	100000	300000
Cost ($)	50000	55000	65000	80000

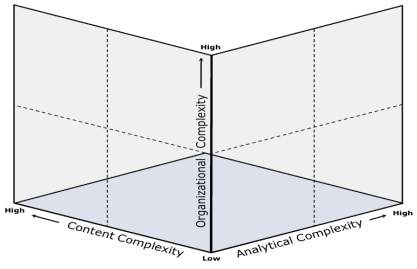
$$-100000+\frac{-25000}{(1+x)^{1}}+\frac{-5000}{(1+x)^{2}}+\frac{35000}{(1+x)^{3}}+\frac{220000}{(1+x)^{4}}$$

x = 0.1

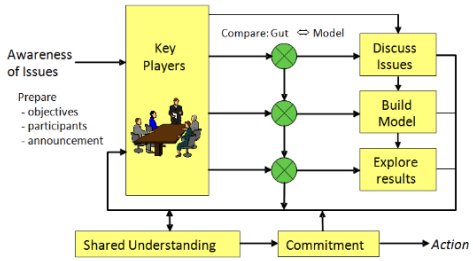
Your answer: 49,699.48

1. Plunging in
2. Frame blindness
3. Lack of frame control
4. Overconfidence in our judgment
5. Short-sided shortcuts
6. Shooting from the hip
7. Group failure
8. Fooling ourselves about feedback
9. Not keeping track – not learning
10. Failure to audit our decision process

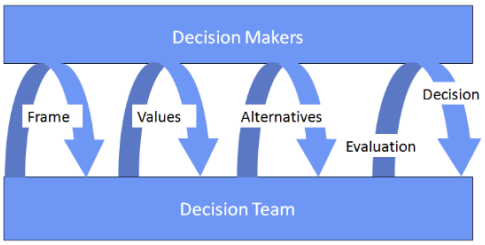

1. Appropriate Frame
2. Clear Values and Trade-offs
3. Creative, Doable Alternatives
4. Meaningful, Reliable Information
5. Logically Correct Reasoning
6. Commitment to Action
Elements of Decision Quality



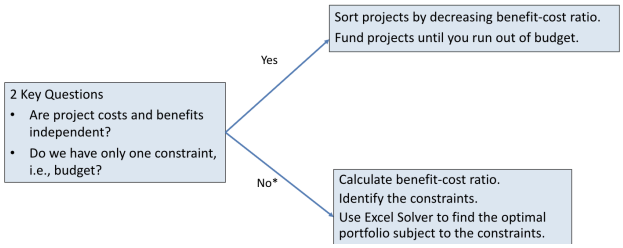
Decision Conference



Dialogue Decision



	Direct	Proxy
Natural	**Net Present Value System Reliability Probability of Detection**	**Number of Subsystems (System Reliability) # of sensors deployed (Probability of Detection)**
Constructed	**Olympic Diving Scoring 5 star JD Powers rankings**	**Performance Evaluation Categories (Promotion Potential) Student Grades (Student Learning)**


2 Key Questions
• Are project costs and benefits independent?
• Do we have only one constraint, i.e., budget?
Yes
Sort projects by decreasing benefit-cost ratio.
Fund projects until you run out of budget.
No*
Calculate benefit-cost ratio.
Identify the constraints.
Use Excel Solver to find the optimal portfolio subject to the constraints.

	Project Value Models	Portfolio Value Models
Advantages	Project model is simple. Project value depends only on project funding and project constraints. Project owners can evaluate their project and identify shortfalls for VFT.	It is the technically correct solution if project value is not additive.
Disadvantages	Requires the assumption that the value of the portfolio is equal to the sum of the value of the funded projects. Assumes value and cost of not funding is zero.	Portfolio value models is more complex and may be nonlinear. Hard to explain why project was not funded.